

.BEGIN-MANUAL;2	57	
SAMPLE.PUB;1	2	
SCAN.HELP;1	1	
SCROLL.MANUAL;4	7	
.HELP;2	2	
SEARCH.MANUAL;3	6	
.INFO;6	2	
SEARCHDIR.HELP;1	1	
SEARCHP.HELP;1	2	
SEGSAV.HELP;1	1	
SETTING-UP-NEW-USER-DIRECTORIES.INFO;1		1
SIMCOM.HLP;1	2	
SIMDDT.HLP;1	5	
SIMRTS.HLP;1	2	
SIMULA.HLP;3	2	
SITBOL.HELP;1	18	
SNDMSG.HELP;7	3	
SNOBOL.MANUAL;1	40	
SORT.HLP;1	2	
.INFO;1	1	
SOS.HELP;5	7	
.MANUAL;1	54	
SOUP.HLP;1	2	
.MANUAL;2	13	
SPELL.MANUAL;10	7	
SPSS.MANUAL;1	11	
SRCCOM.UPDATE;1	1	
STP.MANUAL;1	83	
.INDEX;1	2	
SUMEX-JSYS'S.INFO;2	12	
SUPXEC.MANUAL;2	9	
SYSDPY.HELP;1	2	
SYSIN.HELP;1	1	
SYSTEM-SCHEDULE.INFO;4	2	
TAPE.INFO;1	1	
TCTALK.MANUAL;2	28	
.SAMPLE;1	2	
.HELP;1	4	
TECO.SAMPLE;1	1	
.COMMANDS;1	3	
.HELP;1	1	
.TEXT1;1	7	
.TEXT2;1	3	
.SUMMARY;1	4	
TEKTRONIX.HELP;1	1	
TELNET.INFO;1	2	
TENEX-EXEC-MANUAL-UPDATE.INFO;6		16
TERMINAL-LINKING.INFO;1	1	
TIPCOPY.HELP;1	1	
TMERGE.HELP;4	1	
TRITAP.HELP;1	1	
TV .UPDATE;12	9	
.MANUAL;9	26	
TYMNET-INSTRUCTIONS.INFO;4	3	
TYPEIN.HELP;2	2	

UPCASE.HELP;1	1	
USER-NAME-ADDRESS-PHONE.INFO;109		20
VIEW.HELP;2	2	
WHOIS.HELP;1	1	
XED.MANUAL;301	19	
.301-CHANGES;301	5	
.NEWS;301	1	
XSEARCH.ALGORITHM;1	8	
.HELP;2	9	
XT .HELP;1	1	

220 FILES, 1779 PAGES

## &lt;BULLETINS&gt; DIRECTORY LISTING

The following is a listing of the <BULLETINS> directory which is a repository of informal or transient information about the system, subsystems, current events, and items of interest.

<BULLETINS> 13-MAY-76 08:20:41

FILE NAME	SIZE (COMPUTER PGS)
12-MAR-75.SYSLTR;1	3
AIM-WORKSHOP-ATTENDANCE.BBD;1	5
ARITHMETIC.BBD;1	1
ARPANET.BBD;1	2
BANK.BBD;1	1
BASIC.BBD;1	4
BATCH.BBD;1	1
BULLETINS.BBD;1	2
CALENDAR.BBD;4	1
COMPATIBILITY.BBD;1	1
CONSTANTS(PHYSICAL-OR-CHEMICAL).BBD;1	1
CRYPTION.BBD;1	2
DATA-MEDIA.BBD;1	1
DATACOMPUTER-SCHEDULE.BBD;1	1
DDT.BBD;1	1
DFTP.BBD;1	1
DO .BBD;1	1
EDIT.BBD;1	2
EMPLOYMENT-WANTED.BBD;1	1
EXCESS-BAGGAGE.BBD;1	1
FAIL.BBD;1	1
FILE-MANAGEMENT.BBD;1	3
FILES.BBD;1	6
FORTTRAN.BBD;1	19
FTP.CHANGES;1	1
GOOD-LISP-USAGE.BBD;2	6
GOOD-SYSTEM-USAGE.BBD;1	2
GUEST-LIST.BBD;2	1
ILISP.BBD;1	1
IMP-PM-SCHEDULE.INFO;1	1
IN-WATS.BBD;1	1
JSYS.BBD;1	1
KWIC.BBD;1	3
LEAP.BBD;1	1
LIBRARY-SAIL.BBD;1	5
LINK10.BBD;1	1
LINKING.BBD;1	1
LISP.BBD;2	2
LIST.BBD;1	2
LOGIN-CMD.BBD;1	1
LOGIN-MESSAGES.BBD;2	58
MACRO.BBD;1	1

MEETINGS.BBD; 1	1	
MLAB.BBD; 1	3	
NEW-EXEC.INFO; 9	9	
PDP11-GT40.BBD; 1	2	
PLOT.BBD; 1	3	
PLOTTER.BBD; 1	1	
PROTECTION.BBD; 1	1	
PUB.BBD; 1	7	
RECORD.BBD; 1	2	
SAIL.BBD; 1	4	
SEARCH.BBD; 1	2	
SNDSMSG-READMAIL.BBD; 1	2	
SORT.BBD; 1	1	
SOS.BBD; 1	1	
SPELL.BBD; 1	1	
TECO.BBD; 1	2	
TESTIMONIALS.BBD; 1	1	
TIMING.BBD; 1	3	
TYMNET.BBD; 1	1	
.NODE-DOWNTIME; 1	1	
TYMNET-RESPONSE-STATISTICS.JUN/75-APR/76; 1		16
USER-INTERFACE-PROTOCOLS.BBD; 1		2
WORKSHOP-DEMO-SCHEDULE.INFO; 1		1

75 FILES, 293 PAGES

## APPENDIX G

## SUMEX-AIM SUMMARY FOR ARPANET RESOURCES HANDBOOK

The following material was assembled as a description of the SUMEX-AIM resource for the ARPANET RESOURCE HANDBOOK (NIC 23200), Edited by E. J. Feinler of the Network Information Center at Stanford Research Institute.

(SUMEX-AIM)    Stanford University Medical EXperimental Computer

(FUNCTION)

SERVER    COMPUTER: PDP-10    HOST ADDR. 56    IMP 56/HOST 0

The SUMEX (Stanford University Medical EXperimental Computer) project is a cooperative computer resource involving participation by the Biotechnology Resources Branch of the National Institutes of Health and a variety of major research projects, many of which are also supported by ARPA and which thereby are authorized for access to the ARPANET.

SUMEX encompasses a dual mission: 1) supporting the development of artificial intelligence (AI) computer science research with special emphasis on biological and medical problems and 2) the demonstration of computer resource sharing within a national community. The SUMEX resource resides administratively within the Genetics Department of the Stanford University Medical School and serves as a nucleus for a growing community of projects, both within and external to Stanford. SUMEX provides computing facilities specifically tuned to the needs of AI research and communication tools to facilitate inter- and intra-group contacts as well as trial dissemination of research products to medical users. The project also develops tools for and takes an active role in stimulating community relationships among collaborating projects and medical researchers. Currently active projects span a broad range of application areas such as clinical diagnostic decision-making, molecular structure-interpretation, belief systems modeling, mental function modeling, and instrument data interpretation.

(ADDRESS)

SUMEX-AIM Computer Project, TB105  
Stanford University Medical Center  
Stanford, California 94305

(PERSONNEL)

(PRINCIPAL-INVESTIGATOR)

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(CONSULTANT)  
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(SYSTEM-USE)

(POTENTIAL USERS)

For information and introductory literature contact:

Dr. Elliott Levinthal  
 AIM User Liaison  
 SUMEX Computer Project  
 c/o Department of Genetics, S047  
 Stanford University Medical Center  
 Stanford, California 94305

User projects are separately funded and autonomous in their management and are selected for access to SUMEX on the basis of their scientific merit as well as their commitment to the community goals of SUMEX. Procedures for access to SUMEX are governed by a national advisory group. GUEST access is provided only for limited demonstrations of applications programs developed by the various SUMEX projects. Applications for GUEST access should be made either to Dr. Levinthal (address above) or the Principal Investigator of the particular project offering the program.

SUMEX-AIM does not sell computer time.

Long-term online storage is not available to network users.

(SERVICE-SCHEDULE)

SYSTEM DOWNTIME:

THUR -- 18:00 to 24:00 for preventive maintenance  
 SUN -- 6:00 to 10:00 for system backup

TYPICAL PRIME TIME LOAD = 22 users  
 MAX. NO. USERS = 50 users  
 NO. NETWORK SLOTS = 24

## (LOGIN)

## TELNET INFO:

- . Appropriate transmission mode = Character-at-a-time
- . Appropriate echo mode = Full-duplex; however, TENEX will also operate in half-duplex.
- . Mapping between NVT and local character set uses the full ASCII character set; <CR-LF> received from an NVT is passed to TENEX as New Line (Octal 37).
- . TENEX EXEC does not distinguish between upper and lower case alphabets and will accept either. At SUMEX the defaults are "no raise" and "lowercase". If the "raise" command is given then lower case characters received will be translated to upper case, and echoed in upper case. "No lowercase" causes lower case characters to be sent to the terminal as upper case.
- . The user can declare his/her terminal type to EXEC as follows:  
     [@]terALT[minal (type is)] TYPE <CR>
- . TIP settings - t e 0, e r

## USER INFO:

Free experimental use is not available.

- . USERNAME = user's last name
- . ACCOUNT NAME = an assigned string
- . PASSWORD = user's assigned password

## LOGIN:

Full Duplex Login (default condition)

Connect to SUMEX-AIM, then type:

```
[@]login <SP> USERNAME <SP> PASSWORD <SP> ACCT-NAME <CR>
[job xx on tty xx date time]
[previous login: date time]
[other active jobs for this user if any]
[current systems messages if any]
[next scheduled downtime]
[execution of commands from <username>login.cmd if any]
[notification of the existence of new mail if any]
[@]
```

Half-Duplex Login

Connect to SUMEX-AIM, then type:

```
[@]half <CR>
[.]login <SP> USERNAME <SP> PASSWORD <SP> ACCT-NAME <CR>
[job xx on tty xx date time]
[previous login: date time]
[other active jobs for this user if any]
[current systems messages if any]
[next scheduled downtime]
[execution of commands from <username>login.cmd if any]
[notification of the existence of new mail if any]
[.]
```

#### Guest Login

\*GUESTs are users authorized to run the various applications  
 \*programs. They are provided with a restricted version of  
 \*the EXEC and restricted access to other resources not  
 \*directly related to running the programs. SNDMSG capability  
 \*is available.

Connect to SUMEX-AIM, then type:

```
[.]guest <SP> LASTNAME <SP> GUEST-PASSWORD <CR>
[ Checking guest registry ...]
[We would like to get some general information from you as
                                                                    our guest.]

[(CTRL-X to redo the current prompt.)]
[Full name? (end with CR)]
NAME
[Affiliation? (end with CR)]
AFFILIATION
[Mailing address, phone number? (end with ^Z)]
ADDRESS
PHONE-NO.
CONTROL-Z
[From whom did you get the password? (end with CR)]
NAME
[Thank you. If you come in as a guest again, and use the]
[name "NAME", you will skip these questions.]
[Type "ACCESS" to see what programs are currently available
                                                                    to guests.]

[job xx on tty xx date time]
[previous login: date time]
[current system messages if any]
[next scheduled downtime]
[.]
[.; ***** WELCOME TO SUMEX *****]
[.; Please type HELP after the @sign if you wish further
                                                                    information.]
[.; NOTE: Say "RUN SNDMSG" to send messages as a guest.]
[.]
```

SUBSYSTEM INTERRUPT = CONTROL C

SUBSYSTEM CONTINUE = [.]con <CR> or [.]c <CR>



## (LOGOUT)

## LOGOUT:

```
[@]logout <CR>
[number of other active jobs for this user if any]
[killed job xx, user xyz, acct stuv, tty xx,
 at DATE TIME used 0:0:0 in 0:0:0]
```

After logout, a Network user should instruct his/her NCP to close both connections.

## AUTOLOGOUT:

Breaking Network connections does not log the user out; however, his/her job becomes "detached". If after 20 min. the job has not been reattached (via the "attach" command), the job is logged out.

## (CONTROL-CHARACTERS)

A few ASCII control characters are listed below:

Delete last character	CONTROL-A (or DEL key)
Delete previous word	CONTROL-W
Delete command or line	CONTROL-X
Abort print	CONTROL-C
Retype edited command	CONTROL-R
Prompt or help	?
Force recognition	ALTMODE
Is-system-still-there?	CONTROL-T

For a complete set of control characters available in TENEX see BBN TENEX EXEC Language Manual. However, note that the DELETE (RUBOUT) key at SUMEX is used for deletion of a single character not abortion of the entire typein as in standard TENEX.

## (HELP)

All TENEX commands available to the user are documented online. The user may obtain a complete list of these commands by typing:

```
[@]?
```

At any point TENEX appears to expect a word or argument, the user may type "?" and a list of allowable keywords or arguments will be displayed.

Also, at SUMEX, help with using the system or the various programs may be obtained by typing:

```
[@]help <CR>
```

## (NETWORK-COMMANDS)

## (LIST-ACTIVE-USERS)

Connect to SUMEX-AIM, then type:  
 [@]systat <CR>

#### (NETWORK-STATUS)

##### GENERAL STATUS

Connect and Login to SUMEX-AIM, then type:  
 [@]netstat <CR>  
 [\*] <CR>

##### NETWORK TENEX LOAD STATUS

Connect to SUMEX-AIM, then type:  
 [@]netload <CR>

#### (LINK-TO-ACTIVE-USERS)

To link to an active user on a given TENEX host,  
 connect to that host, then type:  
 [@]link <SP> ACTIVE USERID <CR>  
                   ACTIVE TTY-NO.<CR>(number - not word 'tty')  
 [@];...MESSAGE...<CR>  
 (NOTE: each line must start with a ';' and end with <CR>)  
 [@];...REPLY...<CR> (Text of reply)  
 [@]break <CR> (breaks link and returns user to EXEC)

To answer a link from an active user, type:  
 [link from smith, job x, tty nn]  
 [@;this is smith, how are you]  
 CONTROL-C (ONLY if not already in EXEC)  
 [@];...REPLY...<CR>

To refuse all links, type:  
 [@]refuse <CR>

Users from other TENEX sites can link to users at  
 SUMEX through the RSEXEC. Users at SUMEX require special  
 authorization for access to RSEXEC to initiate links.

#### (SEND-MESSAGE)

Login to TENEX, then type:  
 [@]sndmsg <CR>  
 [to:] USERNAME@HOSTNAME <CR>  
       (NOTE: Here the user must actually type an "@"  
       followed by the HOSTNAME of the recipient.  
       If coming through a TIP, type two '@' signs.)  
 [cc:] USERNAME@HOSTNAME,USERNAME@HOSTNAME,etc. <CR>  
 [subject:]...HEADER or TITLE.....<CR>  
 [message:].....TEXT.....<CR>  
 .(edit with control-A,Q,R,X or DEL).<CR>  
 ...(call TECO to edit or.....<CR>  
 ....insert file with CONTROL-B)....<CR>  
 .....end with CONTROL-Z  
 [q,s,?,carriage-return:] <CR> sends the mail at once

Q delivers mail later  
? lists other options

## (GRIPE)

Login to SUMEX-AIM, then type:  
[@]gripe <CR>  
[gripping on subject of] general <CR>  
[message (? for help):]  
.....MESSAGE.....  
CONTROL-Z  
[thank you for your comments]  
[@]

## (RETRIEVE-MESSAGE)

During TENEX login this statement will appear:  
[you have a message]  
Also, at SUMEX, at regular intervals, the message file  
will be checked and this statement will appear:  
[you have new mail]

To retrieve the message type:  
[@]readmail <CR> <CR>  
[;<FILENAME>message.txt;1 DATE TIME  
SENDER]  
[.....TEXT.....]

For interactive reading and deletion of selected  
messages use the BANANARD program rather than READMAIL  
[@]BANANARD <CR>  
<- (help is available on-line by typing ? ).

To delete all messages from your directory, type:  
[@]delete message.txt <CR>  
[@]expunge <CR>

## (CONSULTATION)

TENEX offers two ways to send messages to system  
programmers. They are the subsystems GRIPE and SNDMSG, and  
are obtained by typing the appropriate subsystem name to  
the EXEC. Each subsystem provides self-explanatory  
instructions. GRIPE is generally used for constructive  
criticism about a subsystem or TENEX. In general gripes  
are low level criticisms to which formal responses are not  
generally made. SNDMSG should be used for direct questions  
to specific individuals. If a user does not know which  
specific individual to contact, a message can be sent  
via SNDMSG to SUMEX@SUMEX. The message file on this  
directory will be read by the consultant (to be appointed  
shortly) and redirected to the appropriate member of the  
systems staff for action.

## (COMMAND-SUMMARY)

To obtain a complete list of commands that exist in the TENEX EXEC login to SUMEX, then type:

[@] ?

TENEX commands are fully documented in the TENEX EXEC Manual (Ref. 4).

General help is also available through the HELP program:

[@]help <CR>

#### (FILE-NAMING)

File names in TENEX are composed of five identifiers. These are device, directory name, file name, extension, and version. These five items uniquely identify any file accessible to a user on the system. The device name identifies which device in the system contains a given file. The directory name gives the directory under which the file appears. The file name, extension, and version identify a particular file in a given directory. Here is an example of a TENEX file name:

DSK:<SUBSYS>TECO.SAV;1

The HELP program contains pointers to general information files available on-line as well as pointers to documentation files for specific programs. It also gives information on the assignment of filenames to public files at SUMEX so that they can be easily located.

#### (PROTOCOLS)

##### (SERVER)

Network Server Protocols currently implemented are:

1. TELNET (Network Standard) (ICP to Socket 1 for old protocol TELNET or Socket 27 for new protocol TELNET)  
Establishes a NVT connection to TENEX.
2. FTP (Network Standard) (ICP to Socket 3).  
Establishes a duplex connection to the File Transfer Protocol Server. SUMEX supports anonymous access to a selected set of directories--login with username as ANONYMOUS and use lastname as the password.
3. TENEX-TENEX (Private Standard) (Socket 105 octal)  
Used for ICP to file transfer service.
4. MAXIM (Private Standard) (ICP to Socket 21).  
Transmits a TENEX "maxim".
5. RSSER (Network Standard) (ICP to Socket 365 octal)  
establishes a duplex connection to RSEXEC server process.
6. RSEXEC (Network Standard) (ICP to

Socket 367 octal). User is connected to the RSEXEC which may be used to access network news, host status, etc.

7. DAYTIME (Private Standard) (ICP to Socket 15)  
Transmits day and time in full format.

(USER)

1. FTP (Network Standard)  
To access, type:  
[@]ftp <CR>  
[\*]help <CR>

(NCP-INTERFACE-FROM-LOCAL-PROGRAMS)

The NCP is implemented within the TENEX file system, and hence a Network connection appears to the assembly-language programmer as a sequential file whose byte size is that of the connection. The usual file JSYSes - openf, closf, bin, bout, etc. - are used to manipulate the connection.

Network connections are distinguished from other TENEX files by their file names, in which local socket number, and remote host and socket number are embedded. See the TENEX JSYS Manual for further information.

(RESOURCES)

(HARDWARE)

(COMPUTER)

TYPE	CORE AMOUNT	CORE SPEED	WORD LENGTH
(2)PDP-10 KI	256K	1 microsec	36 bits

(PERIPHERALS)

	HOW MANY	TYPE	MAKE	MODEL
(DISKS)	6	DOUBLE DENSITY	DEC	RP03
(DRUMS)	2	FIXED HEAD	DIG. DEVEL. CORP.	A7312-D-8
(TAPES)	2	9 TRACK	DEC	TU30
	2	DECTAPE	DEC	TU56
(PRINTER)	1	ROTATING DRUM	DATA PRODUCTS	2410
(PLOTTER)	1	100 STEPS/INCH	CALCOMP	565

(TERMINALS)

SUMEX supports a wide variety of terminals. The most commonly used display terminal is the DataMedia for which a specially designed keyboard is available to interface with the TV-editor used at SUMEX. A variety of other software programs are being developed with special display features designed for use on the DataMedia terminal.

(OPERATING-SYSTEM)

TENEX is a virtual-memory operating system for a time-shared DEC PDP-10 computer that provides a 256K word virtual address space to each process. It permits the creation and running of hierarchies of interdependent processes, accommodates large numbers of users, has extensive file system capabilities, and a well human-engineered executive command language. Most programs written for the standard DEC monitor (10/50 code) run directly.

SUMEX runs a special version of TENEX, modified for the KI-10 computer from the original BBN KA-10 version, to accommodate the KI-10 paging hardware. Preliminary modifications to TENEX version 130 for the KI-10 were made by Dan Murphy at DEC. Under Rainer Schulz, that system was extensively debugged and updated to version 131 (at the NASA Ames Research Center) as well as substantially improved in throughput (at Stanford: Institute for Mathematical Studies in the Social Sciences and SUMEX). This version of KI-TENEX currently operating at SUMEX has approximately twice the throughput of KA-TENEX systems. The staff is currently debugging a dual processor version of TENEX.

SUMEX has a broad range of users including many computer novices. To facilitate smooth interface with our community of users, we have made a number of local modifications to TENEX, particularly the EXEC. Many of these are in the area of user-settable options. A complete list and description of these modifications to the standard TENEX EXEC is available online in <DOC>TENEX-EXEC-MANUAL-UPDATE.INFO .

#### (USER-PROGRAMS)

##### (APPLICATIONS PROGRAMS)

These offerings are expected to increase as our newer projects become established. A list of the current programs is available to GUESTs by typing "ACCESS".

##### DENDRAL PROGRAMS:

##### CONGEN

-----

##### (TYPE)

Chemistry: Computer-Assisted Structure Elucidation

##### (CONTACT)

JOHNSON@SUMEX or SMITH@SUMEX

##### (DESCRIPTION)

Congen (CONstrained structure GENeration) accepts as input known structural features of an unknown molecule (whose

elemental composition is known) and produces all structural isomers consistent with these data. The features and constraints are entered in an interactive session with the program and results can be drawn at a terminal or further constraints added based on examination of new data. CONGEN represents an initial version of a program for computer-assisted structure elucidation. The structure generator which underlies CONGEN has been described (see Masinter et. al., J. Amer. Chem. Soc., 96, 7702 (1973) and *ibid.*, 7714 (1974)).

(ACCESS)

For GUESTs:            [@]congen <CR>  
For Regular Users:    [@]sysin <dendral>congen <CR>

(DOCUMENTATION)

<DENDRAL>CONGEN.DOC

INTSUM

-----

(TYPE)

Chemistry: Mass Spectrometry

(CONTACT)

JOHNSON@SUMEX or SMITH@SUMEX

(DESCRIPTION)

Given a set of known, related structures and the mass spectrum corresponding to each structure, INTSUM suggests possible fragmentation processes which resulted in the observed ions, and then summarizes the results in terms of processes which are general to the class of structures, and those which are specific to certain members of the class. (See Smith et. al., Tetrahedron, 29, 3117 (1973)).

(ACCESS)

For GUESTs:            [@]intsum <CR>  
For regular users:    [@]sysin <dendral>intsum <CR>

(DOCUMENTATION)

<DENDRAL>INTSUM.DOC

MOLION

-----

## (TYPE)

Chemistry: Mass Spectrometry

## (CONTACT)

JOHNSON@SUMEX or SMITH@SUMEX

## (DESCRIPTION)

Molecular ion determination program. Given a (low or high resolution) mass spectrum in which the molecular ion may or may not be present, this program suggests a ranked list of candidate molecular ions. (See G. Dromey, B. G. Buchanan, D. H. Smith, J. Lederberg and C. Djerassi, J. Org. Chem., 40, 770(1975)).

## (ACCESS)

For GUESTs: [ @ ]molion <CR>

For Regular Users: [ @ ]sysin <dendral>molion <CR>

## (DOCUMENTATION)

<DENDRAL>MOLION.DOC

## PLANNER

-----

## (TYPE)

Chemistry: Mass Spectrometry

## (CONTACT)

JOHNSON@SUMEX or SMITH@SUMEX

## (DESCRIPTION)

Planner infers possible structures of unknown compounds (singly or as mixtures) given a mass spectrum and fragmentation rules of the class of compounds to which the unknown(s) presumably belongs. (See Smith et. al., J. Amer. Chem. Soc., 94, 5962 (1972); ibid., 95, 6078 (1973)).

## (ACCESS)

For GUESTs: [ @ ]plan <CR>

For Regular Users: [ @ ]sysin <dendral>plan <CR>

## (DOCUMENTATION)

<DENDRAL>PLAN.DOC



## MYCIN PROGRAMS:

## MYCIN

-----

## (TYPE)

Interactive Consultation for Infectious Disease Patients

## (CONTACT)

SCOTTE@SUMEX

## (DESCRIPTION)

MYCIN is an interactive program which utilizes data available from the microbiology and clinical chemistry laboratories, plus the physician's response to computer-generated questions, to provide physician nonspecialists with consultative advice on diagnosis and antimicrobial therapy for patients with bacterial infections. The program also has interactive capabilities allowing the user to request explanations of the consultation program's actions and reasoning, to ask about MYCIN's static knowledge base or about specific conclusions made during the consultation, and to teach the program by entering new pieces of judgmental knowledge.

## (ACCESS)

For GUESTs:            [@]mycin <CR>  
 For Regular Users:    [@]<mycin>mycin <CR>

## (DOCUMENTATION)

&lt;MYCIN&gt;MYCIN.DOC

## HIGHER MENTAL FUNCTIONS MODELING PROGRAMS:

## PARRY

-----

## (TYPE)

Interactive simulation of paranoid thought processes

## (CONTACT)

COLBY@SUMEX or FAUGHT@SUMEX or PARKISON@SUMEX

## (DESCRIPTION)

PARRY is an interactive simulation of a model of paranoid thought processes. The purpose of the user (usually a

clinical psychiatrist) is to conduct a first interview with the patient (PARRY) and obtain a diagnosis. The interview usually lasts 40-60 input/output pairs. The program is divided into two modules: the recognizer module and the response module. The recognizer accepts natural language input expressions (English) to determine its semantic content. The response module uses the model's inference, affect, and intentions mechanisms to determine the appropriate response.

(ACCESS)

For GUESTs:            [@]parry <CR>  
For Regular Users:    [@]<parry>parry <CR>

(DOCUMENTATION)

<PARRY>PARRY.DOC

#### GENERAL UTILITIES PROGRAMS FROM NIH:

MLAB

----

(TYPE)

Mathematical Modeling

(CONTACT)

JOHNSON@SUMEX

(DESCRIPTION)

MLAB stands for MODELAB which stands for "modeling laboratory". It is a program which allows one to do scalar and matrix computations, curve-fitting, and differential equation solving. Graphic facilities are also provided. This program was written by, and obtained from, Gary Knott at DCRT/NIH.

(ACCESS)

For GUESTs:            [@]mlab <CR>  
For Regular Users:    [@]mlab <CR>

(DOCUMENTATION)

<SYSSUP>MLABD.TXT (also available as interactive help)

OMNIGRAPH

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(TYPE)

Terminal Independent Graphics Software

(CONTACT)

JOHNSON@SUMEX

(DESCRIPTION)

Omnigraph is a graphics subroutine package, designed by Robert F. Sproull while at DCRT/NIH, for driving a number of different display devices with either SAIL or FORTRAN as the programming language. The Omnigraph system is designed for routine graphics applications, not for high-performance terminals. Terminals which can be used with this package include Dec GT/40, Dec 340, Tektronix 4010, Computek, and the Ards.

(ACCESS)

Used by linking appropriate language dependent code in with the program which incorporates the Omnigraph calls. Terminal type is defined at run-time, and appropriate code is loaded by the system. Language dependent code segments are available as LIB:DISSAI for SAIL, LIB:DISFOR for F40 Fortran, and as LIB:DISF10 for FORTRAN-10.

(DOCUMENTATION)

<DOC>OMNIGRAPH-USER'S-GUIDE.INFO

RUTGERS RESEARCH RESOURCE ON COMPUTERS IN BIOMEDICINE:  
[To be supplied later]

(LOCAL SOFTWARE PROGRAMS)

SUMEX is willing to provide copies of any of its non-contract software programs to other interested sites. The following is a list of those programs which originated at IMSSS or SUMEX with SUMEX as their network distribution point that should be of particular interest to other TENEX sites. To facilitate the most efficient distribution of these programs, we request that any site desiring one of the programs appoint a single person to serve as the local contact with SUMEX for that program. The designated person should communicate directly with the author of the program (listed below). In this way, we can insure that the interested site receives a correct working version of the program as well as any updates as they become available. We also request that any subsequent comments or bug reports be channeled to SUMEX through the local contact. If local modifications need to

be made, we will be happy to incorporate them under conditional compilation switches in the master sources thereby simplifying the procedure of moving to updated versions in the future. We cannot be responsible for maintaining versions of these programs obtained in any other manner.

#### TENEX SAIL:

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SAIL which was developed at SU-AI is an ALGOL-like language with complex data- and control-structure extensions for artificial intelligence research and it compiles reasonably efficient code. Robert Smith at IMSSS has TENEXized SAIL. It has been given complete access to the facilities provided by TENEX and a number of new features (random input-output, interrupt system) have been added. These changes were merged into the master-files at SU-AI insuring integrity of the SAIL software.

SUMEX and IMSSS are currently organizing a SAIL library. Anyone interested in contributing routines should contact DANIELS@SUMEX.

A number of utilities to support SAIL usage are also available at SUMEX including:

BAIL written by John Reiser at SU-AI which is an interactive runtime debugging package

PROFIL written by D. Sweet which gives the frequency of execution of SAIL statements

FILCHK written by R. Smith which checks SAIL programs for loader incompatibilities

FORMAT written by R. Smith which adds a table of contents and optional index to SAIL programs

Contact RSMITH@SUMEX for details.

#### TENEX UCI-LISP:

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UCI-LISP is an extension of LISP 1.6 with many new features. It has been TENEXized at IMSSS by Tom Wolpert. The pmapped IO is extremely fast. It also includes the edit and break packages of 1972 INTERLISP. TENEX UCI-LISP is approximately 6 times faster than INTERLISP. Complete documentation is available. Contact WOLPERT@SUMEX for details.

MACHINE-INDEPENDENT SAIL

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A machine-independent compiling system is being developed for a major subset of the SAIL language by Clark Wilcox at SUMEX. Compilers have been created for a number of machines, including the PDP-11, PDP-10, IBM-SYSTEM/360, and NOVA. The compiler and much of the runtime system are written in SAIL, so that the system is portable. This system is still developmental but will be available in the near future. Inquiries should be addressed to WILCOX@SUMEX-AIM .

#### RECORD:

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The RECORD program by R. Smith creates pseudo-teletype jobs. It requires the pseudo-teletype code developed at AMES which is not supported in the standard BBN TENEX system. It can be used for running 3 jobs simultaneously from the same terminal with easy switching back and forth. It optionally makes a typescript of the entire session on the pseudo-teletype which is very nice for preparing documentation on program use, keeping a record of applications users, recording the action of program bugs, etc. RECORD also allows for detaching from running jobs with a very large buffer for storing program output until the job is reattached. Contact RSMITH@SUMEX for details.

#### TV:

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TV is a display-oriented editor for use on DATAMEDIA, TEC, IMLAC and several other display terminals. It was written by Pentti Kanerva at IMSSS and is a relative of several other TV-editors developed at IMSSS and SU-AI. It provides many features for updating text files, such as good cursor control user-defined macros, and string searching. The latest version of TENEX SAIL is required to compile the editor. Contact P. Kanerva through NSMITH@SUMEX for specifics on which terminals are or could be supported by the additional of a terminal dependent front end for the editor. An older version of the editor is also available for non-TENEX PDP10 sites.

#### PUB Macros Package and Documentation:

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PUB is a document preparation language written by Larry Tesler formerly of SU-AI and currently at XEROX-PARC. A complete set of PUB macros for easy use of PUB has been written by Nancy Smith at SUMEX with a full manual describing the use of this package. The macros are designed to produce interestingly formatted documents by relatively inexperienced

computer users. It is designed for a non-XGP TENEX site.  
Contact NSMITH@SUMEX for details.

DDT:

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Robert Smith at IMSSS has added single-stepping to TENEX DDT.  
Contact RSMITH@SUMEX for details.

#### (NEW DEC RELEASES WITH TENEX MODIFICATIONS)

SUMEX has purchased the latest FORTRAN10 package from DEC and modified both the programs and PA1050 to get it running on TENEX. SUMEX, of course, cannot share the sources but would be happy to share the modifications with any other TENEX sites who are DEC-authorized users of the new FORTRAN10. The following is a partial list of the late release DEC software running at SUMEX:

FORTTRAN10	Version 4
F40	Version 27
LINK10	Version 2A
MACRO	Version 50
BLIS10	Version 5
RUNOFF	Version 10

#### (OTHER LICENSED SOFTWARE)

SITBOL (Stevens Institute of Technology version of SNOBOL)

#### (STANDARD SOFTWARE PROGRAMS)

The following are the major standard TENEX and/or DEC programs routinely offered at PDP10 sites which are available at SUMEX plus an assortment of programs which we have obtained from other network sites. In some cases, local modifications have been made. The documentation for these programs can be located with the assistance of the HELP program.

ADDMSG	DCHANGE	FRKCOM	MACRO	REDUCE	SYSIN
AID	DDT	FTP	MAILSTAT	RUNFIL	TALK
BANANARD	DED	FUDGE2	MAILSYS	RUNOFF	TAPCNV
BASIC	DELVER	GRIPE	MULTI	SAIL	TCTALK
BCPL	DUMPER	HOSTAT	NETSTAT	SDDT	TECO
BINCOM	F40	IDDT	PA1050	SNDMSG	TTYTRB
BLIS10	FAIL	ILISP	PCSAMP	SNOBOL	TTYTST
BSYS	FED	INTERLISP	PIP	SORT	TYPBIN
CALENDAR	FILCOM	LD	POET	SOS	TYPREL
CAM	FILDMP	LINK10	PPL	SPELL	UDDT
CCL	FILES	LOADER	PUB	SRCCOM	WATCH
COPYM	FILEX	LOADGT	RD	SUBMIT	XED

CREF            FORTAN10    LOADVT            READMAIL  
 (LOCAL UTILITIES PROGRAMS)

SUMEX also has a number of local utilities programs which we would be happy to share with other sites but for which we are unable to provide maintenance or guaranteed further support. (Many of these programs are from IMSSS).

2SIDES	makes files for multi-column & 2-sided listing
ACCESS	gives a list of programs available to guests
BACKUP	short term file loss protection
BUDGET	budget preparation program
CARDS	creates online "card catalog" for a library
CLEAN	file by file directory clean-up
CRYPT5	en/decrypts text files
DCHECK	reads blocks of file into core & examines with DDT
DIREXT	lists directory ordered by file extension
DIRNUM	translates directory name to no. for DEC programs
DO	creates or appends a line to a reminder file
DONE	deletes a line from a reminder file
FREQ	ranks words in text file according to frequency
LOWCASE	converts a text file to lowercase
NEWFILES	prints info on all user's files written in 24 hrs.
NEWINFO	prints info on all public files written in 24 hrs.
NON	zero-compresses, removes linenos., pagemarks, etc.
PERUSE	allows fast reading of random parts of a file
RPURGE	interactive selection of files to purge--records write/create/purge date--optional comments on file
RTTY	types out a file starting at the end (reverse)
SEARCHDIR	substring search of directory information--like wildcard for names--also searches on author & date
SEARCHP	substring search of multi-files with PERUSEing of random parts of the file
TBASIC	TENEXized version of Dartmouth Basic
TMERGE	merges specified pages from file(s) into new file
TODAY	lists the contents of today's reminder file
UPCASE	converts a text file to uppercase
WHAT	lists the contents of a reminder file
WHOIS	looks up username & prints name/address info
XSEARCH	very fast substring search of multiple files with optional production of "hit" list for TV-editor
Z	logout from lower forks.

(INTERESTS)

(SUMEX STAFF)

The interests of the SUMEX staff center around two themes:

- 1) providing easy access to the system for a community of remote users with widely differing computer experience including medical professionals with no previous computer experience and
- 2) developing means to facilitate communication and resource sharing among the various projects. Therefore, areas of interest and program development include: message sending and

reading facilities, creation of an on-line bulletin board, organization of on-line documentation with a help system for easy access of the material, development of libraries of program routines, acquiring of available utilities packages, and study of techniques for acquiring and employing user models in all of these areas.

(SUMEX PROJECTS AND THEIR PRINCIPAL INVESTIGATOR(S) )

(STANFORD)

DENDRAL

Prof. C. Djerassi (Chemistry)  
 Prof. J. Lederberg (Genetics)  
 Prof. E. Feigenbaum (Computer Science)

MYCIN

Prof. S. Cohen, M.D. (Pharmacology)  
 Dr. B. Buchanan (Computer Science)

PROTEIN CRYSTALLOGRAPHY MODELING

Dr. S. Freer (Chemistry, U.C. San Diego)  
 Prof. E. Feigenbaum (Computer Science, Stanford)  
 Dr. R. Engelman (Computer Science, Stanford)

(NATIONAL)

COMPUTER MODEL OF DIAGNOSTIC LOGIC (DIALOG) -- U. of Pittsburgh

Dr. H. Pople  
 J. Myers, M.D.

HIGHER MENTAL FUNCTIONS MODELING -- UCLA

Kenneth M. Colby, M.D.

MEDICAL INFORMATION SYSTEMS LABORATORY (MISL) -- U. of Illinois

Dr. B. McCormick at Chicago Circle  
 M. Goldberg, M.D.

RUTGERS RESEARCH RESOURCE COMPUTERS IN BIOMEDICINE -- Rutgers U.

Prof. S. Amarel

There are also a number of pilot-projects both at Stanford and nationally.

(DOCUMENTATION)

(PROGRAMS)

A list of the available on-line documentation of programs and general information files describing the SUMEX system and policies is available through running of the HELP program. A list of the hardcopy documentation available and procedures for obtaining copies



is contained in <DOC>A-LIST-OF-AVAILABLE-DOCUMENTATION.INFO.

(PROJECTS)

The following is a partial bibliography of research papers by the various projects. More complete bibliographies can be obtained by contacting the individual project leaders.

DENDRAL:

1. D. H. Smith, L. M. Masinter, and N. S. Sridharan, "Computer Representation and Manipulation of Chemical Information", W.T. Wipke, S. Heller, R. Feldmann, and E. Hyde, Eds., John Wiley and Sons, Inc., 1974, p. 287.
2. R. E. Carhart et. al., "Applications of Artificial Intelligence for Chemical Inference. XVIII. An Approach to Computer-Assisted Elucidation of Molecular Structure", J. Amer. Chem. Soc., in press, Sept. 1975.
3. Duffield et. al., "Applications of Artificial Intelligence for Chemical Inference. II. Interpretation of Low Resolution Mass Spectra of Ketones", J. Amer. Chem. Soc., 91, 2977, (1969).
4. R. E. Carhart, et. al., "Networking and a Collaborative Research Community: A Case Study Using the Dendral Programs", to appear in the Proceedings of the Amer. Chem. Soc., Aug. 1975.

HIGHER MENTAL FUNCTIONS MODELING:

1. W. S. Faight, K. M. Colby, R. C. Parkison, "The Interaction of Inferences, Affects, and Intentions in a Model of Paranoia", AIM-253, December 1974, Stanford AI Laboratory.
2. K. M. Colby, R. C. Parkison, B. Faight, "Pattern-Matching Rules for the Recognition of Natural Language Dialogue Expressions", AIM-234, Stanford Artificial Intelligence Laboratory, Stanford, California, June 1974.

MYCIN:

1. E. H. Shortliffe, F. Rhame, et. al., "MYCIN, A Computer Program Providing Antimicrobial Therapy Recommendations", Clinical Research, vol 23, p 107A (abstract) 1975.
2. E. H. Shortliffe, S. G. Axline, B. G. Buchanan, S. N. Cohen, "Design Considerations for a Program to Provide Consultations in Clinical Therapeutics". Presented at San Diego Biomedical Symposium 1974 (February 6-8, 1974).
3. E. H. Shortliffe, R. Davis, S. G. Axline, B. G. Buchanan, C. C. Green, and S. N. Cohen, "Computer-Based Consultations in Clinical Therapeutics: Explanation and Rule Acquisition Capabilities of the MYCIN System", to appear in Computers and